Tungsten isotope Heterogeneities in Archean Komatiites

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Recent studies demonstrated that the short-lived ^{182}Hf-^{182}W isotope system ($t_{1/2}$ ~ 9 Myr) is a valuable tool for exploring key processes in the early evolution of the Earth, such as mantle differentiation by magma ocean crystallization or crustal extraction and late accretion [1, 2, 3]. The 3.8 Ga Isua rocks [1], the 2.8 Ga Kostomuksha komatiites [2] and the Nuvvuaggittuq supracrustal rocks [3] have ~15 ppm ^{182}W excesses, which is similar to the predicted W isotope composition of the mantle prior to late accretion. However, the mantle source of Kostomuksha komatiites has HSE contents similar to that of the PM estimates, which is inconsistent with preservation of a pre-late accretionary mantle reservoir. Instead, their mantle source must contain an old component, which formed by magmatic differentiation or metal-silicate equilibration and, as a result, inherited a high Hf/W ratio during the lifetime of ^{182}Hf.

Here, we present new high-precision W isotope data for 3.3 Ga komatiites from the Weltevreden formation of the Barberton Greenstone belt and 2.4 Ga komatiites from the Vetreny belt. All Vetreny komatiiites show small ^{182}W excesses that average +6.2±4.5 ppm (2σ SD, n = 5). At present, no ^{182}W anomaly can be resolved in the Weltevreden komatiites (μ^{182}W = -4.1±4.7 ppm, n = 2). Similar to 3.5 Ga Komati komatiites [2], the Vetreny and Weltevreden komatiites have W isotope compositions close to that of the modern mantle, consistent with mantle sources having received most of the terrestrial complement of late accreted material, as indicated by the relatively high calculated HSE abundances in their mantle sources (~80% of the PM estimates, [4, 5]). There is therefore no evidence for a gradual increase of late accreted material contribution in the mantle sources of Archean komatiites from 3.5 Ga to 2.4 Ga, in contrast to earlier conclusions [6]. Our new data rather suggest that most late accreted materials were delivered to Earth and homogeneized in the deep mantle prior to 3.5 Ga.

[1] Willbold *et al*., (2011) *Nature* **477**, 195-199. [2] Touboul *et al*., (2012) *Science* **335**, 1065-1069. [3] Touboul *et al*. (2013) *EPSL*, submitted. [4] Connolly *et al*. (2011), *EPSL* **311**, 253-263. [5] Puchtel *et al*. (2013) *GCA*, submitted. [6] Maier W.D. *et al*. (2009) *Nature* **460**, 620-623.

Seasonal and interannual evolution of the monoacids organics in the atmosphere of the humid savanna of Lamto

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This work was made within the framework of the network IDAF. It concerns the follow-up of the acidity of the atmosphere of an ecosystem of wet savanna from the organic fraction of the free acidity. It is a question of understanding the major factors which cause the variability of this organic acidity in the interannual and seasonal scales. During ten-year period (1995- 2004) 860 rainy samples were collected in the wet savanna of Lamto. By using Henry's law, we determined the contents in the air of major organic monoacids (HCOOH and CH3COOH) from the concentrations of these acids measured in rains. The annual partial pressure of organic monoacids on the decade is extremely variable. It is 0,675 ± 0,56 ppb and of 0,413 ± 0,14 ppb respectively for the formic acid and for the acetic acid. This strong variability is bound to their various sources which are also very variable from one year to the next. The organic acidity varies from 40 % to 60 % on average and almost stable rest from a season to the other one. The seasonal analysis shows that generally the partial pressures of organic acids are of a factor twice as raised in dry season that in wet season. This difference is not inevitably connected to the quantity of haste registered from a season to the other one. But would more be connected to the biomass burning which contribute from 21 % to 51 % to the formation of organic acids in the wet savanna of Lamto.

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